

## Honey Therapy can Decrease the Wound Healing Process in Diabetes Mellitus Patients

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### Abstract

**Background:** Treatment of wounds in Diabetes Mellitus patients can be done with nonpharmacological therapy. Herbal treatment in Diabetes Mellitus patients for wound healing one of them is using honey.

**Objectives:** The purpose of this study is to determine the effectiveness of honey therapy to the wound healing process in diabetic mellitus patients in the hospital room dr. Mintohardjo Jakarta.

**Methods:** This study uses experimental research methods with pretest-posttest two control group design research. The population in this study was diabetes mellitus patients. Samples in this study as many as 20 respondents with Purposive sampling Techniques. The instrument used is the Bates-Jensen Wound Assessment Tool observation sheet. Statistical tests used paired T test (paired simple t test) and independent t test.

**Results:** Based on the results of research suggests that it is known that there is an effectiveness of honey and NaCl therapy as a wound healing process in diabetes mellitus patients. From the results of the study, it is also known that there are differences in the effectiveness of honey therapy and NaCl therapy to the wound healing process in diabetic mellitus patients.

**Conclusion:** The effectiveness of honey therapy to the wound healing process in diabetic mellitus patients in the hospital room dr. Mintohardjo Jakarta.

**Keywords:** honey, wounds, diabetes mellitus.

### Introduction

Diabetes Mellitus (DM) is a chronic disease that exists in humans in almost all regions of Indonesia. The disease can be characterized by increased levels of sugar in the blood (hyperglycemia) as well as high levels of sugar in the urine (glycosuria).<sup>1</sup> the number of diabetic Mellitus sufferers does not shrink from their health status and many patients have diabetes after complications of the disease that can be the life of the sufferer is disrupted.<sup>1</sup>

There is 2017 based on the report of the International Diabetes Federation (IDF) that in the world the number of diabetes mellitus patients reaches 425 million people ranging in age from 20 to 79 years old. Based on world health organization data (WHO) is known to record Indonesia is the 6th country with the highest DM load in the world, WHO data shows that more than 10 million Indonesian experienced it. They also reported that the number may increase over time as evidenced by the RISKESDAS report which shows the prevalence of diabetes mellitus in Indonesia in the adult population of 6.9% in 2013 and 2018 there has been an increase of up to 8.5%. The World Health Organization (WHO) can predict diabetes mellitus will hit more than 21 million Indonesians by 2030.<sup>2</sup>

Pathophysiology of diabetes mellitus is a decrease in insulin secretion due to autoantibodies that can reduce pancreatic island. Various complications of the disease that are at risk for diabetics can become a problem in the nerves of the skin that cause numbness or numbness due to high sugar levels. This condition is at risk of developing diabetic wounds.<sup>3</sup> Diabetes mellitus without proper self-management will develop into an annual disease and will cause complications such as gangrene. This causes diabetic Mellitus susceptible to infection, which is closely related to the breeding of germs in the environment with high glucose levels. Poor and improper and ineffective wound treatment can be bad for wounds experienced by people with diabetes mellitus.<sup>4</sup>

Ineffectiveness of wounds and delays can lead to complications in the form of amputations. Some types of wound treatment include foam, honey, hydrogel, alginate, and polyurethane film. Sufferers adapted to their economic circumstances, for practical and inexpensive wound treatment, usually using liquid antiseptics and physiology, decomposing wounds and using sterile gauze and adding antibiotics *chloramphenicol*, *tetracycline HCL*, *silver sulfadiazine* 1%, bacitracin, bioplasenton, and gentamicin sulfate are commonly used but can be detrimental antibiotics, such as increasing the number of colonies in wounds, causing pain and sensitivity to sulfa.<sup>4</sup> Wound treatment in people with diabetes mellitus can be done with non-pharmacological therapy. Honey is a non-pharmacological therapy usually given in the treatment of diabetes mellitus wounds. The antibacterial properties of honey help fight infections of the wound and its anti-inflammatory action can reduce pain and improve circulation that contributes to the healing process. Honey also stimulates the growth of new tissues, so in addition to speeding up healing, it also reduces the appearance of scarring or scarring on the skin.<sup>5</sup>

The high sugar content in honey can slow the growth of bacteria. Its thick texture helps to form a protective anti-rot coating from the outside. Honey has high osmolarity properties that breed bacterial life. Some studies suggest that the treatment of herbs in gangrene patients uses olive oil, honey, and aloe vera. Treatment of wounds in patients with diabetes mellitus can be done with non-pharmacological therapy. Honey is a non-pharmacological therapy usually given in the treatment of diabetes mellitus wounds.<sup>6</sup>

Based on previous research by Nabhani it is known that in the honey community is believed to be a treatment including wounds, honey is also easy to obtain in addition to being effective in the wound healing process. Wound Curing can be done with Bates Instrument - *Jensen Wound Assessment Tool*.<sup>7</sup> Another study by Asbaningsih used the BWAT scale in diabetic ulcer patients. Stating a strong correlation ( $r = 0.789$ ;  $p = 0.0005$ ) between BWAT scale instruments in assessing DM wounds.<sup>8</sup> Based on the above phenomenon, the authors aim to examine whether Honey Therapy can Decrease the Wound Healing Process in Diabetes Mellitus Patients.

## Methods

This research uses a *pre-experimental design*, using *pretest-posttest* two control *group design*. The population in this study was diabetic Mellitus patients who underneath made wound healing treatments. This study sampled as many as 20 respondents using the *purposive sampling technique*. The research instrument uses an observation sheet and *Bates-Jensen Wound Assessment Tool* (BJWAT). This study has passed the ethics test at the ethics commission with the number: 1817/Sket/Ka-Dept/RE/STIKIM/IX/2020.

## Results

**Table 1.** Distribution of Frequency of Respondents By Age, Gender, Gender, Length of Suffering From Diabetes Mellitus Wounds (N=20)

variable	Frequency (n)	Percentage (%)
<b>age</b>		
Final adulthood (36 – 45 years old)	3	15,0
Early elderly period (46 – 55 years)	7	35,0
Late elderly period (56 – 65years old)	9	45,0

Senior period (65 and up)	1	5,0
<b>gender</b>		
Male	13	65,0
woman	7	35,0
<b>education</b>		
Sd	2	10,0
Junior	4	20,0
Sma	9	45,0
bachelor	5	25,0
<b>long-suffering from wounds</b>		
1-5 years old	13	65,0
5-10 years old	7	35,0

Source: Primary Data 2020

Based on table 1 Distribution of the Frequency of Respondents by Age, Gender, gender, length of suffering from diabetes mellitus wounds shows that the picture of action shows the age of diabetic wounds in hospital dr. Mintohardjo Jakarta is known that So most of the respondents aged 56-65 years are as many as 9 respondents (45%). Gender characteristics in diabetic wounds in hospital dr. Mintohardjo Jakarta is known to be mostly male respondents, namely 13 respondents (65%).

Educational characteristics of diabetic wounds in hospital dr. Mintohardjo Jakarta is known that most of the respondents' education is high school equivalent which is as much as 9 respondents (45%). Characteristics of long-standing m show suffering from diabetes mellitus wounds in diabetic wounds in hospital dr. Mintohardjo Jakarta is known that most of the old criteria suffered wounds of 1-5 years, namely as many as 13 respondents (65%).

**Table 2.** Distribution of Frequency of Wound Healing Process Before and After Honey and NaCl Therapy in Diabetes Mellitus Patients (N=20)

Healing Process	before		after	
	F.	%	F.	%
Honey Therapy				
Network Health	0	0	1	10
RDegeneration Wounds	8	80	9	90
Degeneration of Wounds	2	20	0	0
Total	10	100	10	100
NaCl				
Network Health	0	0	1	10
RDegeneration Wounds	8	80	9	90
Degeneration of Wounds	2	20	0	0
Total	10	100	10	100

Source: Primary Data 2020

Based on table 2 shows the process of wound healing before and after honey therapy is known that the wound healing process before being given honey therapy is degeneration of wounds there as much as 2 (20%) and wound regeneration there are as many as 8 (80%) whereas after being given honey therapy is Tissue Health there are as many as 1 (10%) and wound regeneration there are as many as 9 (90%). So partly as big as before wound healing honey therapy with the criteria of wound degeneration r but there are still degeneration wounds but after the wound healing process with the criteria wound regeneration is no longer there and more are criteria degeneration wounds and some are already the processes of tissue health.

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degeneration Wound is no longer there and more are criteria degeneration of wounds and some are already the process of tissue health

**Table 3.** Effectiveness of Honey and NaCl Therapy on Wound Healing Process in Diabetes Mellitus Patients (N=20)

Wound Healing Process	N.	Mean Differences	P-value
Before and After Honey Therapy	10	13,20	0,000
Before and After NaCl Therapy	10	13,20	0,000

Source: Primary Data 2020

Based on table 3 it is known that the effectiveness of honey therapy to the wound healing process in diabetes mellitus patients is known to *mean differences* of 13.20 meaning positive value then there is a tendency to decrease before and after honey therapy for wound healing. Statistical test results are known that the value of p-value 0.000 means  $P < 0.05$ , it can be concluded that proven effectiveness of honey therapy as a wound healing process in diabetes mellitus patients.

Based on table 3 it is known that the effectiveness of NaCl therapy to the wound healing process in diabetes mellitus patients is known to *mean differences* of 7.70 meaning positive value, hence the tendency to decrease before and after NaCl therapy for wound healing. Statistical test results are known that the value of p-value 0.000 means  $P < 0.05$ , it can be concluded that the proven effectiveness of NACL therapy as a wound healing process in diabetes mellitus patients.

**Table 4.** Independent t Test

group	N.	Independent t-test	
		T.	Sig
honey	10	3,158	0,005
NaCl	10		

Source: Primary Data 2020

Based on table 4 it is known that based on the output of the Independent t-test it is known that the value of Sig, amounting to  $0.005 < 0.05$  so that it can be concluded that there is a significant difference between the average group of honey therapy and NACL therapy in the process of wound healing diabetes mellitus.

## Discussion

### Characteristics of Respondents

Based on the results of the study showed the age in diabetic wounds in the Hospital Room dr. Mintohardjo Jakarta is known that patients with the criteria of late adulthood 36-45 years, namely as many as 3 respondents (15%), early elderly age 46-55 years, namely as many as 7 respondents (35%), the age of elderly late 56-65 years, namely as many as 9 respondents (45%) and senior age of 65 years, namely as many as 1 respondents (%). So most of the respondents were 56–65 years old. In line with pramana research, it can be known that the most age is over 60 years old, which is 8 respondents. This is by Ikram in Purnomo which states that the increasing age of intolerance to glucose is also increasing. So for the elderly group, a higher blood glucose limit is required than the limit used to enforce the diagnosis of diabetes mellitus in non-elderly adults. According to the assumption of researchers In the elderly "55 years of degenerative decline is due to peripheral nerve sensitivity and decreased tissue flexibility that will spur the onset of diabetes mellitus wounds.

The results also showed the gender of diabetic wounds in the hospital. Mintohardjo Jakarta is known that patients with male gender criteria are as many as 13 respondents (65%) and 7 respondents (35%). So most of the respondents' genders were male. Pranama's research found that the number of respondents between men and women is the same, which is as many as 7 respondents. Based on the research that with the female gender dominates the number of diabetic ulcer patients as many as 53 people (62.4%), while patients with the male gender amounted to 32 people (37.6%). Based on the researchers' assumption that men and women alike can occur diabetic wounds.

The results also showed education on diabetic wounds in hospital dr. Mintohardjo Jakarta is

known that patients with elementary education criteria are as many as 2 respondents (10%), junior high school as many as 4 respondents (20%), high school as many as 9 respondents (45%), and Bachelor's degree of 5 respondents (25%). So most of the respondent's education is high school equivalent. In line with the research that the last respondents showed most of the respondents were high school educated, namely as many as 24 respondents (27.0%) and the lowest distribution of undergraduate education as many as 12 respondents (13.5%). In line with the opinion of Natoatmodjo, the level of education is an indicator that a person has studied formal education in a particular field, but not an indicator that one has mastered several fields of science.<sup>9</sup> A person with a good education, more mature in the process of changing him, so that it is easier to accept the external influence of a positive, objective and open to various information including informs about health.<sup>9</sup> From the results of research conducted by related researchers can be concluded that the higher a person's education, the better the information received to accelerate healing poses.<sup>9</sup>

The results also showed longtime suffering from diabetes mellitus wounds in diabetic wounds in the hospital dr. Mintoahardjo Jakarta is known that patients with the old criteria suffered wounds of 1-5 years, namely as many as 13 respondents (65%) and 5-10 years of age as many as 7 respondents (35%). So most of the old criteria suffer wounds 1-5 years. In theory, diabetes is categorized into 3 short durations of 1 -5 years, medium durations of 6 -10 years, and long durations of more than 10 years. Based on research shows that the average length of time respondents have diabetes mellitus is 6-10 years (36%). This is similar to research conducted by Issa & Baiyewu on the quality of life of type 2 diabetes mellitus patients in Nigeria, where the most respondents were with long-term diabetes mellitus 6-8 years.<sup>10</sup> As well as Mier's research, found in general respondents had type 2 diabetes mellitus less than 10 years.<sup>11</sup> From the results of the study conducted by the relevant researchers can be concluded that many patients who do nurses with a short duration of 1-5 years, if seen from the previous study more over 5 years, therefore, patients who have a short duration more feel the desire to recover than those who have long suffered from diabetes mellitus wounds.

### **Distribution of Frequency of Wound Healing Process Before and After Honey Therapy**

Based on the results of the study showed the process of wound healing before and after honey therapy is known that the wound healing process before being given honey therapy is wound degeneration there as much as 2 (20%) and wound regeneration there are as many as 8 (80%) whereas after being given honey therapy is Tissue Health there are as many as 1 (10%) and wound regeneration there are as many as 9 (90%).

In line with Ayu Ningsih's research that Honey as an antibacterial has a mixture of 48% sugar and water content of 15-20% so that the content makes bacteria can not live. Honey can activate plasminogen into plasmin, this plasmin will later become fibrin thread that facilitates blood flow. High levels of honey glucose increase that produce an energy source for macrophages.<sup>12</sup>

The application of therapy using honey is by the theory that honey has high levels of osmolarity to inhibit the growth of bacteria and accelerate the wound healing process. Honey creates moisture that is not affected by the environment, which causes that honey is very well absorbed by the skin. As a topical treatment agent, honey is easily absorbed by the skin so that it can cause moisture on the skin and provide the nutrients needed for skin by conducting diabetes mellitus wound treatment with honey it is expected that the death and amputation rates in people with Diabetes Mellitus can decrease, and improve the health of the People of Indonesia.<sup>13</sup>

From the results of research conducted by related researchers can be concluded that the antibacterial properties of honey help overcome infections in the need and anti-inflammatory action can reduce pain and improve circulation that affects the healing process. Honey also stimulates the growth of new tissues, so that in addition to speeding healing also reduces the onset of scars or scars on the skin.

### **Frequency Distribution of Wound Healing Process After and After NaCl Therapy**

Based on the results of the study showed the Wound Healing Process After and After NaCl Therapy is known that the process of healing wounds after being given NaCl therapy is degeneration

of wounds there as much as 2 (20%) and wound regeneration there are as many as 8 (80%) while after being given NaCl therapy in wound regeneration there are as many as 10 (100%).

In line with Purnomo et al' research, the average value of wound development using NaCl is 23.26, 22.47, and 20.67 where the value is included in the wound status range between wound regeneration and wound degeneration. The development of wounds using a 0.9% NaCl compress showed no noticeable improvement/change. Score Bates-Jansen in 9 days of treatment decreased between 2–3 points, so to achieve wound repair regeneration-maturation grade takes a long time and blood sugar level control and strict diet regulation.<sup>14</sup>

Based on the theory that NaCl Compress is less effective to prevent the onset of necrotic tissue, while the presence of necrotic tissue in ulcers to be a hiding place of bacterial colonies also inhibits the process of tissue granulation. Na Cl 0.9 % solution is an isotonic liquid and is also a physiological salt liquid that is good for cleaning, washing, and compressing wounds. NaCl 0.9 % has a composition and concentration of fluids that are almost the same as body fluids so as not to irritate the tissues. But in principle, all the use of topical therapy is to provide an effective healing process to wounds.<sup>15</sup>

From the results of the study conducted by related researchers can be concluded that the healing process of DM wounds with NaCl does how any significant improvements/changes. This is because based on the theory that NaCl Compress is less effective to prevent the onset of necrotic tissue, while the presence of necrotic tissue in ulcers becomes a hiding place of bacterial colonies also inhibits the process of tissue granulation.

#### **Effectiveness of Honey and NaCl Therapy on Wound Healing Process in Diabetes Mellitus Patients**

Based on the results of the study it is known that the effectiveness of honey therapy to the wound healing process in diabetes mellitus patients know ton a *mean differences* of 13.20 means positive value then there is a decrease in the tendency before and after honey therapy for wound healing. Statistical test results are known that the p-value 0.000 means  $P < 0.05$ , it can be concluded that proven effectiveness of honey therapy as a wound healing process in diabetes mellitus patients.

Based on previous research by Nabhani it is known that in the honey community is believed to be a treatment including wounds, honey is also easy to obtain in addition to being effective in the wound healing process. Some studies suggest that the treatment of herbs in gangrene patients uses olive oil, honey, and aloe vera. Treatment of wounds in patients with diabetes mellitus can be done with non-pharmacological therapy. Honey is a non-pharmacological therapy usually given in the treatment of DM wounds. Nabhani research From the test results of data paired t-test results, t count, 5,000 and p-value 0.015 because the results t calculate 5,000 above the price or table t: 2.35 and  $p < 0.05$ , then it is concluded there are benefits of honey to accelerate the healing process of gangrene wounds.<sup>7</sup>

In theory, the high sugar content in honey can slow the growth of bacteria. Its thick texture helps to form a protective anti-rot coating from the outside. Honey has high osmolarity properties that breed bacterial life. Wound treatment in people with diabetes mellitus can be done with non-pharmacological therapy. Honey is a non-pharmacological therapy usually given in the treatment of diabetes mellitus wounds. The antibacterial properties of honey help fight infections of the wound and its anti-inflammatory action can reduce pain and improve circulation that contributes to the healing process. Honey also stimulates the growth of new tissues, so in addition to speeding up healing, it also reduces the appearance of scarring or scarring on the skin.<sup>5</sup>

From the results of research conducted by related researchers can be concluded that honey can slow down the growth of bacteria and Honey also stimulates the growth of new tissues, so in addition to accelerating healing, honey also reduces the appearance of scarring or scarring on the skin.

Based on the results of the study it is known that the effectiveness of NaCl therapy to the wound healing process in diabetes mellitus patients is known to *mean differences* of 7.70 meaning positive value then there is a decrease in the tendency before and after NaCl therapy for wound healing. Statistical test results are known that the value of p-value 0.000 means  $P < 0.05$ , it can be

concluded that proven effectiveness of NaCl therapy as a wound healing process in diabetes mellitus patients.

In line with research, Purnomo et al have to do dm wound healing with NaCl obtained Z value: 6,482 with p: 0,000 ( $< 0.05$ ). Pranama research states that there is NaCl effective in the wound healing process with p: 0.008 ( $< 0.05$ ).<sup>14</sup> In theory that it is due to the nature of NaCl fluid 0.9% which is a more safe physiological fluid used. NaCl 0.9% is a safe isotonic solubility for the body, does not Irritant protect tissue granulation from dry conditions, treats moisture surrounding wounds and helps wounds undergo healing processes, and is easy to obtain and at relatively cheaper prices. However, NaCl is not antiseptic so it cannot kill bacteria that may be present in the wound.<sup>16</sup>

From the results of research conducted by related researchers can be concluded that NaCl has isotonic properties (safe to be used as a wound cleanse) due to the nature of fluid NaCl 0.9% which is a more safe physiological fluid used. NaCl 0.9% is an isotonic solution safe for the body, not irritants, protects tissue granulation from dry conditions, relieves moisture around the wound and helps the wound undergo the healing process, and is easy to get and relatively cheaper price.

Based on the results of the study based on the output of the Independent t-test it is known that the value of Sig, amounting to  $0.005 < 0.05$  so that it can be concluded that there is a significant difference between the average group of honey therapy and NaCl therapy in the process of wound healing diabetes mellitus. In line with previous research conducted by Pranama, data obtained that there is a difference between the group using honey and those who do not use honey amounted to 0.008 or less than the value of significance 5% or 0.05.<sup>17</sup>

Treatment Group is a group that uses NaCl and Natural Honey (water content less than 18%), where if the wound is treated using a combination of both because NaCl has isotonic properties (safe to use as cleaning wounds) and honey itself can grow a good tissue modulation, as well as cause a moist effect (the wound will experience healing when the conditions around the wound are moist).<sup>17</sup> From the results of the study conducted by the relevant researchers can be concluded that both treatments in this study are equally influential to the wound healing process but the therapy done by giving a spread of honey is better healing compared to the administration of NaCl.

## Conclusion

The results of the study conducted on 20 respondents, namely 10 respondents conducted with honey therapy and 10 respondents conducted NaCl therapy in DM patients. From the results of research before the therapy of honey wounds are still in regeneration and after the therapy of honey wound regeneration does not exist. And the results of the research before NaCl wound therapy are more than partially still in regeneration while after NaCl therapy the wound regeneration is no longer there. Then it can be concluded that honey therapy and NaCl therapy can decrease the wound healing process in diabetic Mellitus patients. It is expected for hospitals to educate health workers and patients with diabetes mellitus to be able to apply honey therapy as a wound healing process.

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